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THE BLIND SNAKES (*TYPHLOPS*) OF HAITI WITH DESCRIPTIONS OF THREE NEW SPECIES¹

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When the Herpetology of Hispaniola (Cochran, 1941) was published only 24 specimens of *Typhlops* were available from the entire island. Recent collecting (1950-1962) in Haiti has produced 93 specimens of blind snakes from that country alone, most of them now in the Museum of Comparative Zoology.

Part of the field work was made possible by the following grants to the Museum of Comparative Zoology: National Science Foundation Grants NSF 16066, NSF 5634, and one from the American Philosophical Society. The six specimens from Gonave Island were obtained by Philip S. Humphrey collecting for the Yale Peabody Museum and the University of Florida. A description of the various expeditions is given in Williams *et al.*, 1963.

I wish to express my appreciation to Ernest E. Williams who was responsible for getting this material together and making it possible for me to study it. Also I wish to thank Doris M. Cochran for permission to study the type of *Typhlops sulcatus*. Miss A. G. C. Grandison supplied counts and descriptive notes on four specimens in the British Museum. Nicholas Strekalovsky made the drawings of the new species herein described.

The following abbreviations are used to designate the collections where these specimens are deposited: AMNH, American Museum of Natural History; CM, Carnegie Museum; MCZ, Museum of Comparative Zoology; UF, University of Florida Museum; USNM, United States National Museum; YPM, Yale Peabody Museum.

¹Notes on Hispaniolan herpetology no. 10.

Examination of this material discloses that in addition to the two species previously known from Haiti, *lumbricalis* and *pusillus*, there are three forms new to science. All of the five species represented in this collection have the following characters in common: relatively narrow strap-like rostrals; completely divided nasals; preocular contacting the third upper labial only; scale rows either 20-20-20 or 20-20-18; at least one pair of enlarged parietal scales; four upper labials; three lower labials; and clearly visible eyes. With this great similarity they also show distinctive differences in the number of middorsal scale rows, number of preoculars, shape and size of ocular, shape of head, and color.

In number of middorsal scales these snakes may be divided into two distinct groups: those with a relatively low number (240-330), two species, and those with over 385, three species. The three new forms are all in the group with the high number of middorsal scales. Two of these are further distinguished by having very small pointed heads.

*TYPHLOPS CAPITULATUS*¹ sp. nov.

Figure 1

Holotype: MCZ 62636. From Manneville, Haiti, at the northwest end of Lake Saumâtre. Collected by A. S. Rand and J. Lazell, 10 August 1960.

Paratype: MCZ 69006. From the same locality as the type. Collected by E. E. Williams and A. S. Rand, 13-14 August 1959.

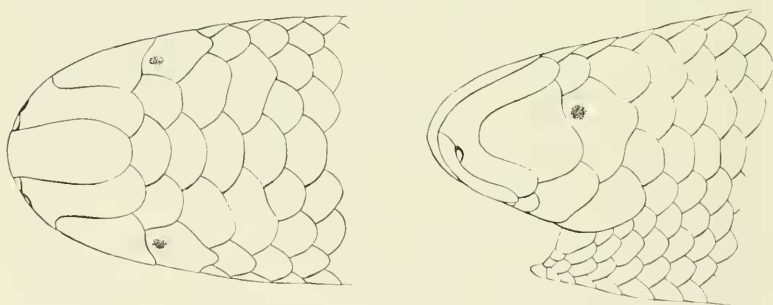


FIG. 1. *Typhlops capitulatus* sp. nov. Type MCZ 62636. From Manneville, Haiti. Dorsal and lateral views.

¹From the Latin "having a small head."

Diagnosis: A slender small-headed species of *Typhlops* characterized by the following combination of characters: high number of dorsal scales, 385-400; scale rows 20-20-20; dorsal color extending on to venter, a white anal spot; preocular almost triangular; head small and pointed; ocular almost as wide as high.

Description: Sides of head tapering from about the level of the seventh middorsal scale. Rostral narrow, its width one-third that of the head, not extending to a line connecting the eyes; nasals completely divided by a suture that extends from the second upper labial to the rostral; preocular almost triangular, approximately as high as wide and in contact with the third upper labial, its anterior edge curved but not elongated. Ocular broad, but little higher than wide, its posterior edge strongly convex (Fig. 1). Two pairs of enlarged parietal scales; two postoculars on each side. Eye small, scale rows around body 20-20-20, dorsal scales from rostral to caudal spine about 400.

Color: Light brown above, somewhat paler below although pigmented, venter with scattered white scales, anal region and underside of tail white, dorsal color fades gradually on head to entirely unpigmented snout.

Size: Total length 205 mm, head width at level of eyes 2.7 mm, diameter at midbody 4 mm, tail slightly longer than wide.

Variation: MCZ 69006 is a very small specimen, total length 93 mm, and is pale brown above and below although the characteristic pattern of pigmentation can be seen with magnification. This specimen has about 385 dorsal scales from rostral to spine. In detail of head scutellation it agrees with the type.

Remarks: This species is most closely related to the species on Gonave Island, described below, from which it may be distinguished by the shape of the preocular.

TYPHLOPS GONAVENSIS sp. nov.

Figure 2

Holotype: YPM 3003. From Point à Raquette, on the south shore of Gonave Island, Haiti. Collected by Philip S. Humphrey and Sarita Van Vleck, 9 April 1959.

Paratypes: YPM 3004, and UF A943. With the same data as the holotype.

Diagnosis: A slender small-headed species of *Typhlops* characterized by the following combination of characters: high number of dorsal scales, 409-423; scale rows 20-20-20; dorsal color

extending on to venter, a white anal spot; may be distinguished from *capitulatus* which it most closely resembles by the distinctive shape of the preocular which is wider than high and narrowest anteriorly.

Description: Sides of head tapering from about the level of the seventh middorsal scale. Rostral narrow, its width one-third that of the head, not extending to the level of the eyes; nasals completely divided by a suture that extends from the second upper labial to the rostral; preocular wider than high, narrowest anteriorly (Fig. 2), in contact with the third upper labial; ocular small but little higher than wide, its posterior edge strongly convex; two pairs of enlarged parietals; two postoculars on each side; eye small; scale rows around body, 20-20-20; middorsal scales from rostral to spine about 418.

Color in preservative: Dark purplish brown above, somewhat paler below but heavily pigmented with an irregular white area in anal region. Dorsal color fades gradually on head to unpigmented snout. Color in life (from notes by Sarita Van Vleck): Reddish brown inferiorly, grading to burnt umber on tail, venter purplish gray anteriorly becoming pale gray-brown posteriorly.

Size: Total length 189 mm, tail 4.2 mm; head width at level of eyes 2.7 mm; diameter at midbody 4 mm; tail slightly longer than wide.

Remarks: This species is most closely related to *capitulatus* on the mainland of Hispaniola and apparently has differentiated from that species following isolation on Gonave Island. It is easily recognized by the peculiar shape of the preocular. These two species have the smallest and the most pointed heads of any of the known Antillean *Typhlops*.

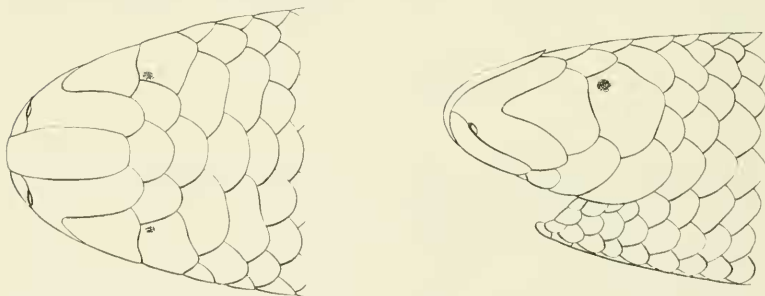


FIG. 2. *Typhlops gonavensis* sp. nov. Type YPM 3003. From Point à Raquette, Gonave Island. Dorsal and lateral views.

TYPHLOPS HAITIENSIS sp. nov.

Figure 3

Holotype: MCZ 62635. From Manneville, Haiti. Collected by A. S. Rand and J. Lazell, 10 August 1960.

Paratypes (14): MCZ 69007-12, from Manneville, Haiti. Collected by E. E. Williams and A. S. Rand, 13-14 August 1959. USNM 117273-74, 117276, from Trou Caiman, Haiti. Collected by A. Curtiss, 18 February 1943. CM 38804-8, from Manneville, Haiti. Collected by George Whiteman, 1963. Manneville is near the northwest end of Lake Saumâtre, on the north edge of the Cul de Sac Plain; Trou Caiman is a small freshwater lake just west of Manneville.

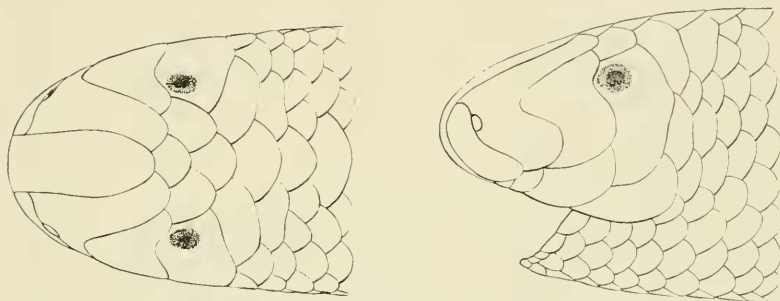


FIG. 3. *Typhlops haitiensis* sp. nov. Type MCZ 62635. From Manneville, Haiti. Dorsal and lateral views.

Diagnosis: A species of *Typhlops* characterized by a high number of dorsal scales, 400-452; scale rows 20-20-20; dorsal color extending on to venter, white anal spot; preocular higher than long, in contact with the third upper labial; ocular narrow, more than twice as high as wide; head broadly rounded as seen from above.

Description: Snout, as viewed from above, truncate and broadly rounded, not tapering; rostral width about one-fourth the width of the head, rostral extending to the level of the eyes; nostrils lateral; nasals completely separated by a suture extending from the second upper labial to the rostral. The preocular higher than wide in contact with the third upper labial only (Fig. 3). One pair of enlarged strap-like parietals each as wide as two body scales; a single postocular; eye large and conspicuous. Scale rows around body 20-20-20, dorsal scales from rostral to tail spine about 435.

Color: The head scales have dark brown centers and relatively wide light margins giving the top of the head a striped appearance; dorsal brown color extends on to the venter where it is interrupted by irregular light areas along the midventral line. The dorsal scales are dark brown with light margins. The light margins are aligned giving the effect of fine light longitudinal lines.

Size: Total length 240 mm, tail 5 mm, width of head at level of eyes 3.5 mm, diameter at midbody 5 mm, tail slightly longer than wide.

Variation: The 14 paratypes agree in details of head scutellation, and in having 20-20-20 scale rows. The number of dorsal scales in this series varies from 400 to 452. The number of enlarged parietal scales also varies. All have one pair of greatly enlarged strap-like scales; some have a second pair equally enlarged, while others show a graded change from this condition to where the second pair is not distinguishable from the body scales. All have a single postocular. The color varies from dark to light brown in the large specimens. The three smallest specimens are very pale above and below, but under magnification it can be seen that the dorsal pigment extends on to the venter in the same pattern observed in the larger specimens. The extent of the light areas on the venter varies considerably; the three specimens from Trou Caiman have little or no brown pigment on the venter, while MCZ 69012 has the venter almost entirely pigmented.

TYPHLOPS PUSILLUS Barbour

The 27 specimens examined from the mainland of Hispaniola agree with those reported by Cochran (1941) except that in this series all have two postoculars between the fourth upper labial and the parietal.

The greatest variation is shown by the three specimens from Gonave Island. These agree with the mainland forms in possessing divided preoculars, two postoculars and in other details of head scutellation. They differ from the mainland specimens in having a lower number of dorsal scales (258-268 compared with 285-319 for the specimens from Bombardopolis on the northwest peninsula). They also differ in color as they are brown above and pale below and in this respect resemble *lumbicalis*.

TYPHILOPS LUMBRICALIS (Linnaeus)

This species has the most extensive range of any of the Antillean *Typhlops*. It has been found on Hispaniola, Cuba, several islands in the Bahamas, and in British Guiana, South America. Throughout this range, it is remarkably consistent in characters: scale rows 20-20-18, rarely 20-18-18; usually one pair of enlarged parietals and usually two postoculars. The middorsal scales range from 240-320 (Legler, 1959).

The established lack of variation in the number of scale rows in various parts of its extensive range makes it very surprising to find a population of this species on the southwest peninsula of Haiti that is highly variable.

There are 41 specimens of *lumbricalis* at hand from the southwest peninsula, representing several localities from Miragoane to Jeremie, and one specimen from Grand Cayemite Island. In number of rows of scales around the body they vary as follows: 22-20-20 (2), 20-20-20 (27), 20-20-18 (12). The number of enlarged parietals also varies: 1L-1R (14), 1L-2R (11), 2L-1R (5), 2L-2R (10). All but one have two postoculars on each side. The exception has the upper postocular on each side fused to the parietal. The number of middorsal scales ranges from 273-324, average 301. Although this is within the known range of variation for *lumbricalis*, it is higher than for most specimens of that species from other parts of Hispaniola. The shape and arrangement of the head scales is the same as in other populations. The color pattern is also the same. Although the number of rows of scales is both high and variable, this population can not be distinguished from *lumbricalis* by any character or combination of characters, and it appears to be one variable population rather than a mixture of two or more forms.

In addition to the specimens from the southwest peninsula, there are five specimens from Port-au-Prince and Manneville. These have the scales in 20-20-18 rows, middorsal scales ranging from 261 to 290, and are typical *lumbricalis*.

Grant (1956) discusses four specimens of *lumbricalis*, three from Eaux Gaillées and one from Port-au-Prince. The number of middorsal scales ranges from 257 to 275 and indicates that these are *lumbricalis* as currently defined. There are also four specimens of *lumbricalis* in the British Museum from Haiti, two from Pont Beudet and two from Hinche. Miss A. G. Grandison supplied the counts for these and the middorsal scales

range from 260-294 — well within the range of variation for *lumbricalis*. The average number of dorsal scales for all 13 specimens from Haiti outside the southwest peninsula is 279 with a range of 257-294.

DISCUSSION

The five species now known from Haiti are similar in having a maximum of 20 scale rows, preocular in contact with the third upper labial only, and a relatively narrow rostral. Yet with this apparent similarity the five forms represent three distinct phyletic lines of *Typhlops*.

1. The group including *lumbricalis* and *pusillus* is distinguished by having a low number of middorsal scales, 240-330. These two forms on Hispaniola are readily separated from each other by the presence of a single preocular in *lumbricalis* and by a divided preocular in *pusillus*.
2. A slender, small-headed group with a high number of middorsal scales, 385-423; this includes two species, *gon-avensis* on Gonave Island, and *capitulatus* on the mainland. These are the most distinctive *Typhlops* in the area as no other species known from the Antilles has such a small head. The two forms are obviously closely related and are probably insular populations of what was originally one form. The two may be distinguished from each other by the shape of the preocular.
3. The third group is represented by one species, *haitiensis*. Like the small-headed forms it has a very high number of middorsal scales (400-454) but unlike the species of that group it has a broadly rounded truncate snout, as well as a distinctively shaped preocular and ocular. Of the five species known from Haiti it is the only one that typically has a single postocular. The others have two postoculars with one occurring as an uncommon variant.

These three different groups do not seem to be closely related to each other. The distributional data, although limited, seem to support the concept that only unrelated forms can occur sympatrically, and even then probably by occupying different ecological niches. For example, *lumbricalis* and *pusillus* appear very similar in body proportions and scutellation, and differ in the number of preoculars. A divided preocular is also known as a rare variant in *lumbricalis* (Legler, 1959).

Probably *pusillus* was derived from *lumbricalis* at sometime when Hispaniola was a series of islands.

Today *pusillus* occurs on the northwest peninsula and ranges across the northern part of the island at least as far as the southern shore of Bahia de Samana. Cochran (1941) reported one specimen from Sanchez and I have examined four from Samana (AMNH 50353-56).

The range of *lumbricalis* includes all of the southwest peninsula and extends eastward along the southern coast where it is known from Barahona (Noble and Hassler, 1933)¹ and San Pedro de Macoris. On the northern coast it is known as far westward as Puerto Plata. The range of the two species overlap on the northeast coast. Whether they are ecologically separated in this area of overlap can not be determined from the available data. At Manneville, the one locality where three species have been found, each species represents a different group.

In view of the large number of *Typhlops* in collections from the northwest peninsula and all of them *pusillus*, it would appear that *lumbricalis* does not occur there. The opposite is true of the southwest peninsula where extensive collecting has revealed only *lumbricalis*.

TYPHLOPS SULCATUS Cope

The finding on Haiti of species with a high number of dorsal scales raised the question of what relationship these forms might have with *sulcatus* on nearby Navassa Island, the only other *Typhlops* known from the Antilles with both 20 scale rows and a high (397) number of dorsal scales. As no other specimens of *sulcatus* have been collected since Cope (1868) described it on the basis of one specimen, the type was examined.

As the type appears today, it is a specimen that was preserved just prior to shedding; in fact, the old head shields have been shed (probably after preservation), and the new head shields are represented by soft raised areas outlined by deep sulci that mark the position of the original sutures. The extensions of the nasal sutures from the nostril to rostral are little more than faint lines but sufficient to indicate that this species does have completely divided nasals. Since Cope (1868) also

¹The specimen with 385 middorsal scales from Alta Vela Island reported as *lumbricalis* by Noble and Hassler (1933) is not that species as currently defined. A preliminary examination discloses this specimen as more closely related to *sulcatus* than it is to the mainland forms.

described this specimen as having completely divided nasals he may have seen it with the nasal plates in place when the sutures might have been more distinct. Other characters of this specimen are: very long parietals extending down the posterior edge of the oculars to well below the level of the eyes, and a single postocular; both of these characters are well shown by Cochran (1941, p. 310, fig. 88). As stated by Cope the body is more slender than that of *lumbricalis*; it is also distinguished from that species by the high number of middorsal scales. From the species on Haiti with middorsal scales over 385, it is distinguished by the shape and size of the ocular and preocular, and by the very long parietals.

This specimen has the snout tapered in front of the eyes very much like *monensis* but not at all like the narrow-headed forms on Haiti which have the entire head tapered from well back of the eyes. Until such time as more specimens are available it seems best to recognize *sulcatus* as a distinct species.

The other characters for this species mentioned in the literature, trilobate snout and incomplete nasal sutures, are conditions that are associated with shedding (Richmond, 1961). The extension of the nasal suture from nostril to rostral is very faint on most specimens of small *Typhlops* and difficult to see at best. As the nasal plate thickens, prior to shedding, the nasal suture from labial to nostril becomes more conspicuous while the suture from nostril to rostral becomes fainter and may actually disappear as a suture although its presence can usually be detected as a fine dark line crossing an otherwise smooth area of the nasal plate. Also associated with shedding are the deep sulci representing the sutures between the other head scales.

Since *sulcatus* is known from only one specimen, and that one shedding, it is little wonder that it has been variously described as having complete nasal sutures (Cope, 1868), incomplete nasal sutures (Cochran, 1924, 1941), and complete on one side and incomplete on the other (Legler, 1959).

TYPHLOPS

Key to the forms occurring in Haiti

- A. Preocular divided *pusillus*
- AA. Preocular single B
- B. Ocular narrow and high, over twice as high as wide, posterior edge of ocular almost straight, preocular higher than wide (400-460 dorsal scales) (Fig. 3) *haitiensis*

- BB. Ocular wide, but little higher than wide, posterior edge strongly convex, preocular as wide or wider than high C
 C. Venter unpigmented, same color as underside of tail, less than 330 dorsal scales, head rounded *lumbricalis*
 CC. Dorsal dark color extending on to venter, underside of tail and anal area white, 380-430 dorsal scales, head tapering . D
 D. Preocular longer than high, anterior angle acute (Fig. 2) *gonavensis*
 DD. Preocular almost triangular, anterior angle rounded (Fig. 1) *capitulatus*

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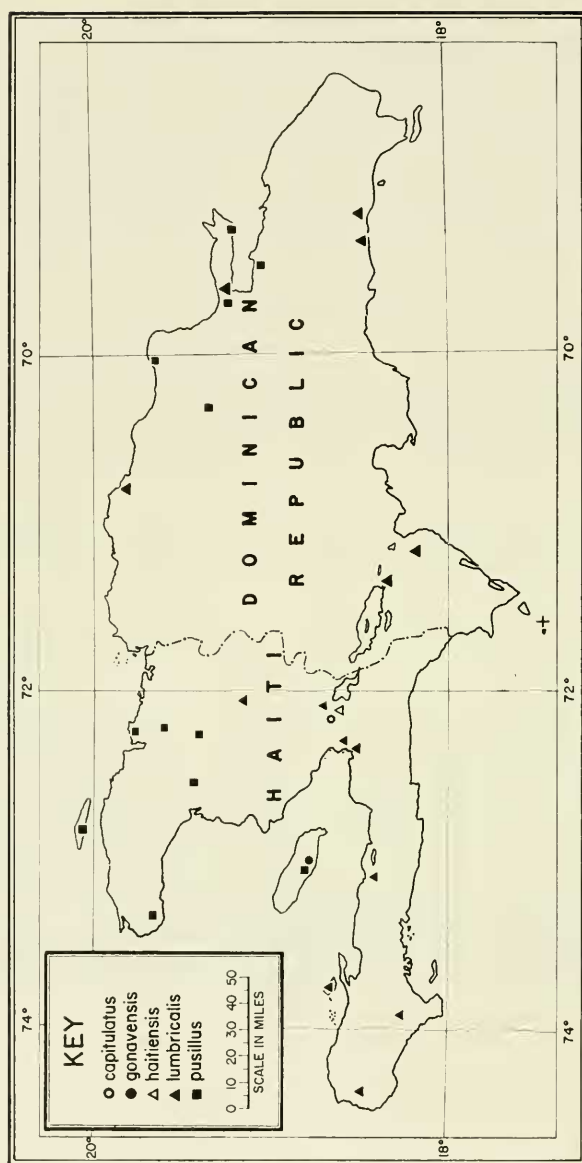


FIG. 4. Distribution of *Typhlops* in Haiti, including published records from Cochran (1941) for *pusillus* and *lumbriicalis*. The cross (+) at lower center of the map indicates the island of Alta Vela from which the prob-
lematical specimen resembling *sulcatus* is derived.